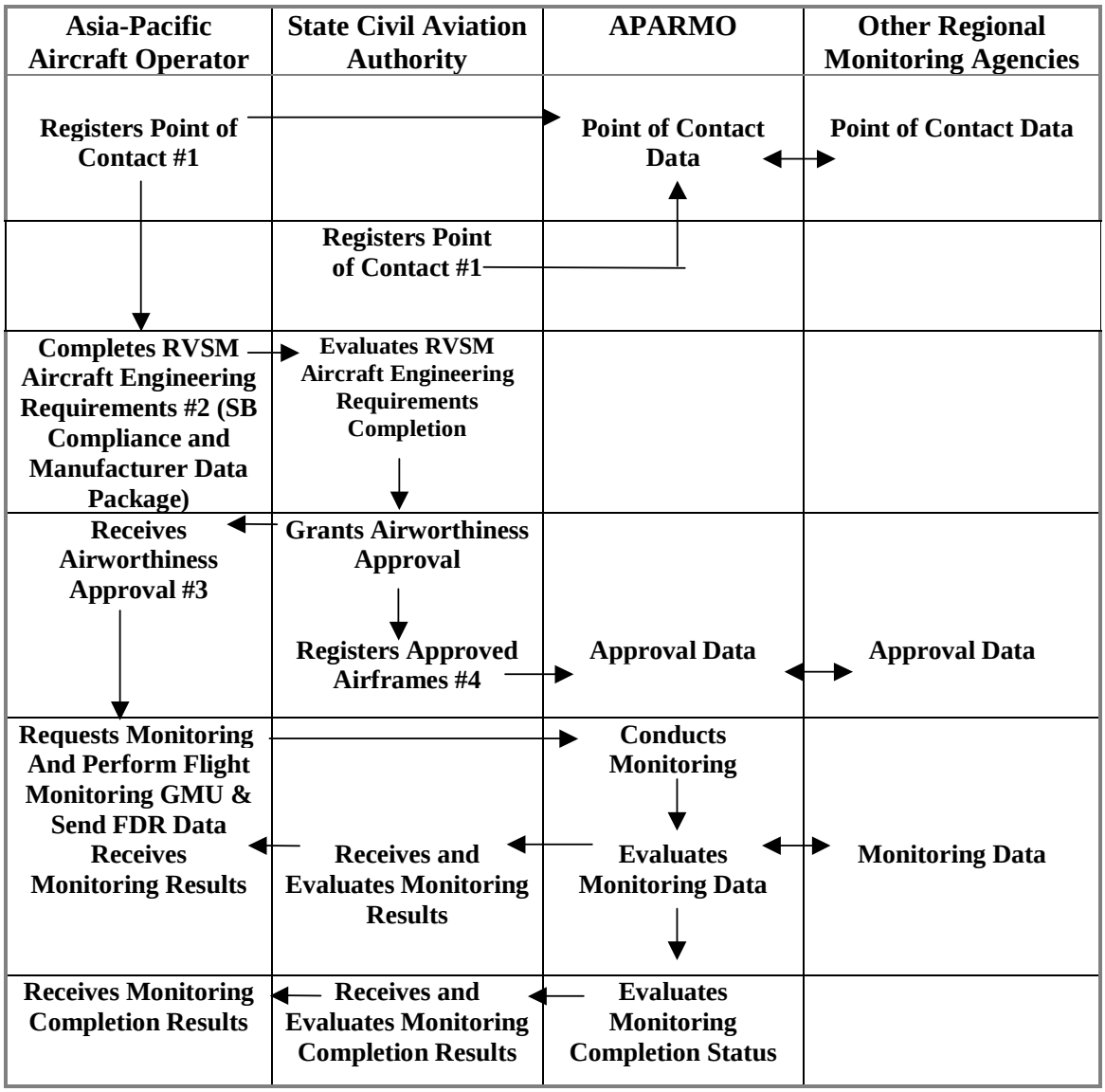
Asia-Pacific Approvals Registry and Monitoring Organization (APARMO)
Information Flow Overview

Airworthiness Approval and Monitoring



Notes:

1 The operator and State civil aviation authority use APARMO Form F1 to submit point of contact data.

2 The operator completes RVSM service bulletin engineering work or submits RVSM eligibility documentation for in-production or new-production aircraft.

3 Upon receiving airworthiness approval, the operator requests monitoring services.

4 The State civil aviation authority use APARMO Form F2 to submit aircraft approval data.

Operational Approval

Asia-Pacific Aircraft Operator	State Civil Aviation Authority	APARMO	Other Regional Monitoring Agencies
Receives Airworthiness Approval ↓			
Completes RVSM Operations and Maintenance Requirements (training, AFM and MEL and Procedure Revisions) →	**Evaluates RVSM Operations and Maintenance Requirements Completion** ↓		
Receives Operational Approval #1 ←	**Grants Operational Approval** ↓		
	Registers Approved Airframes →	**Approval Data** ↔	**Approval Data**

Note: To receive RVSM operational approval after airworthiness approval has been granted, the operator will submit an application to the State Civil Aviation Authority.

ASIA-PACIFIC (*Bay of Bengal and Beyond*)
RVSM MINIMUM MONITORING REQUIREMENTS:
EFFECTIVE AS OF: 07 JUNE 2002

These requirements are applicable to all new applications for the registration of an operator's aircraft on the Asia Pacific RVSM data base.

1. INITIAL MONITORING. All Asia-Pacific (*Bay of Bengal and beyond*) operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the RVSM monitoring program. The attached chart of monitoring requirements establishes requirements for initial monitoring associated with the RVSM approval process. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable initial monitoring requirements.

2. AIRCRAFT STATUS FOR MONITORING. Aircraft engineering work that is required for the aircraft to receive RVSM airworthiness approval must be completed prior to the aircraft being monitored. Any exception to this rule will be coordinated with the State authority.

3. FOLLOW-ON MONITORING. Monitoring is an on-going program that will continue after the RVSM approval process. A follow-on sampling program for additional operator aircraft will be coordinated by the Asia-Pacific (*Bay of Bengal and beyond*) RVSM Implementation Task Force.

4. MONITORING OF AIRFRAMES THAT ARE RVSM COMPLIANT ON DELIVERY. If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the attached chart, the new airframes are not required to be monitored - except as targeted at a later date in the follow-on monitoring program. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the attached chart.

5. APPLICABILITY OF MONITORING FROM OTHER REGIONS. Monitoring data obtained in conjunction with RVSM monitoring programs from other regions can be used to meet Asia-Pacific (*Bay of Bengal and beyond*) monitoring requirements. The Asia-Pacific Approvals Registry and Monitoring Organization (APARMO), which is responsible for administering the Asia-Pacific (*Bay of Bengal and beyond) monitoring program, has access to monitoring data from North Atlantic or Euro-control data base* and will coordinate with States and operators to inform them on the status of individual operator monitoring requirements.

6. UPDATE OF MONITORING REQUIREMENTS CHART AND WEBSITE. As significant data is obtained, monitoring requirements for specific aircraft types may change. When the chart is updated, a letter will be distributed to States and operators. The updated chart will be posted on the APARMO website being maintained by the Federal Aviation Administration (FAA) for the International Civil Aviation Organization (ICAO) Asia/Pacific Air Navigation Planning and Implementation Regional Group. The website address is:

http://www.tc.faa.gov/act-500/niaab/rvsm/aparmo_intro.html

7. PRIOR RVSM EXPERIENCE. When an existing RVSM operators has completed the regional monitoring requirements for State approval *for the North Atlantic or EUROCONTROL RVSM data base registration*, the operator is considered by APARMO to have "Prior RVSM Experience."
For most aircraft types, monitoring is not required to be completed PRIOR to operational approval being granted, however participation in monitoring IS REQUIRED in accordance with the attached chart.

ASIA-PACIFIC APPROVALS REGISTRY AND MONITORING ORGANISATION (APARMO)
EFFECTIVE AS OF: 07 JUNE 2002

MONITORING NOT REQUIRED **PRIOR** TO THE GRANT OF RVSM APPROVAL, HOWEVER PARTICIPATION IN MONITORING **IS REQUIRED** IN ACCORDANCE WITH THIS CHART			
CATEGORY		**AIRCRAFT TYPE**	**MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP**
1	**OPERATORS WITH PRIOR RVSM EXPERIENCE** *a). OPERATORS PLANNING TO CONDUCT OPERATIONS IN PACIFIC AIRSPACE* *b). AND OPERATORS PLANNING TO CONDUCT OPERATIONS IN WESTERN PACIFIC / SOUTH CHINA SEA AREA* *c). AND /OR OPERATORS PLANNING TO CONDUCT OPERATIONS IN BAY OF BENGAL and beyond*	**New aircraft types :** from a manufacturer with a demonstrable track record of the production of MASPS compliant airframes **or** [A30B, A306], A310 (GE), A310 (PW), [A319, A320, A321], A330, A340, B712, [B721, B722] [B733, B734, B735] [B736, B737/BBJ, B738, B739] [B741, B742, B743, B74S] B744, [B752, B753], [B762, B763], B764 [B772, B773], DC10, MD10, MD11, MD80, L101 CL60, GLEX, GLF3, GLF4, GLF5 [F900, F900EX] FA50, FA50EX, F2TH, LJ45 LJ60, H25B	**Two airframes of each type*** to be monitored as soon as possible **but not later then 6 months** after the issue of RVSM operational approval. ** Note. For the purposes of the minimum monitoring requirement, aircraft within parenthesis [ ] may be considered as the same type.*
Category 2 below has been adopted in preparation for RVSM implementation in the Bay of Bengal and beyond Areas on 27 November 2003			
2	**OPERATORS WITHOUT PRIOR RVSM EXPERIENCE** WHOSE OPERATIONS ARE PRIMARILY IN THE BAY OF BENGAL and beyond	Same types as above in section 1.	**At least 3 airframes of each type** unless operator has only 1 or 2 of a type, then all operator airframes of that type should be monitored. Monitoring to be completed as soon as possible but **not later then 3 months** after the issue of RVSM operational approval or not later then 3 months after the start of Bay of Bengal and beyond RVSM operations, whichever occurs later.

MONITORING REQUIRED PRIOR TO THE GRANT OF RVSM APPROVAL			
3	OPERATORS OF AIRCRAFT TYPES SHOWN IN THE BLOCK TO THE RIGHT	**Other group or non –group aircraft** other than those listed above including: A124, ASTR, B707, B731, B732, C525, C560, C650, C750, DC8, DC9, E145, FA10, FA20, F100, GLF2, GALX, H25A, H25C, IL62, LJ31, LJ35, LJ55, MD90 **or** **new aircraft types** from a manufacturer **without** a demonstrable track record of the production of MASPS compliant airframes.	60% of target number of airworthiness approved, same type, airframes of each operator to be monitored **or** individual monitoring of airworthiness approved airframes of a given operator.

Note: Monitoring data obtained in conjunction with RVSM monitoring programs from other regions can be used to meet Asia-Pacific (Bay of Bengal and beyond) monitoring requirement

GPS-based Monitoring System (GMS) Monitoring Procedures

Monitoring is required for all operators of aircraft that have received RVSM operational approval. Current monitoring goals should be reviewed for actual requirements; generally 2 or 3 aircraft of each type must be monitored. Monitoring requirements as well as other RVSM information can be found at the following web sites:

FAA RVSM

- **http://www.faa.gov/ats/ato/rvsm1.htm**

Asia-Pacific Approvals Registry and Monitoring Organization (APARMO)

- **http://www.tc.faa.gov/act-500/niaab/rvsm/aparmo_intro.html**

Airworthiness Approval

In-production or new production aircraft attain airworthiness approval through verification of RVSM eligibility in the Airplane Flight Manual or Type Certificate Data Sheet. In-service aircraft attain airworthiness approval through the application of the type-specific RVSM Service Bulletin. The aircraft engineering requirements vary for individual types or groups of aircraft. These requirements may include upgrades to the air data computers, pitot-static modifications, skin waviness testing, and visual or paint inspections. After airworthiness approval is obtained, the operational approval process is completed by incorporation of RVSM policy and procedures into the training program, manuals, and maintenance program. **Monitoring may be conducted after airworthiness approval information has been sent to the APARMO. Only airworthiness approved aircraft will be monitored.**

APARMO

The APARMO is responsible for all monitoring activity and the operation of the GMS. CSSI Inc., the GMS support contractor, will assist the APARMO with the monitoring program.

GMS Description

The GMS is comprised of the equipment and procedures to collect and process three required data elements: GPS data, pressure altitude or Mode C data, and meteorological data. The GPS-based Monitoring Unit (GMU) is used to collect the GPS data during the monitoring flight. The APARMO, through the use of the attached Flight Information Form (FIF), will coordinate with the operator the collection of pressure altitude or Mode C data from ATC facilities. The operator will provide pressure altitude data from the digital flight data recorder (DFDR) of the aircraft being monitored. Late transmittal of the FIF and illegible or blank entries will delay processing and the dissemination of results. Meteorological data will be obtained by the APARMO without operator involvement.

Monitoring Flights

Monitoring flights do not need to be conducted in Pacific airspace. Monitoring can be conducted on scheduled flights, ferry flights, or monitoring-specific flights. To ensure collection of sufficient position data, the flight must be straight and level at any altitude from FL290 to FL410, and should be at least thirty minutes in duration. Monitoring should also be conducted in areas where Mode-C radar data can be retrieved in a timely manner. In addition to Mode-C collected by the APARMO, the operator should provide pressure altitude data from the Digital Flight Data Recorder (DFDR) to the APARMO for Altimetry System Error (ASE) calculation.

GMU Description

The GMU is a portable unit comprised of a Global Positioning System (GPS) receiver, two GPS antennas, temporarily mounted on interior windows, and a laptop computer. The unit requires plug in power from the aircraft (draws 2.0 to 4.0 amperes maximum) and accepts multiple types of power standard to aircraft. The GMU can be installed in the aircraft cockpit or cabin, depending upon aircraft type. Installation time is approximately 15 minutes. For most transport aircraft, the GMU is best installed using the aft cockpit windows. The GMS Monitoring Specialist typically occupies a jump seat to monitor GMU performance. GMU installation is transparent crew operations.

Monitoring Process

Upon receiving airworthiness approval, the operator should contact the APARMO GMS Operations Coordinator to discuss monitoring options. To start the monitoring process the operator should submit the attached Monitoring Application to the APARMO. The Monitoring Application should include all aircraft that will be operated in the Pacific Region. The collection of GPS data with the GMU can be accomplished by a GMS Monitoring Specialist or by an operator representative that has received GMU training. The operator and the APARMO GMS Operations Coordinator will develop a mutually agreed upon plan for monitoring.

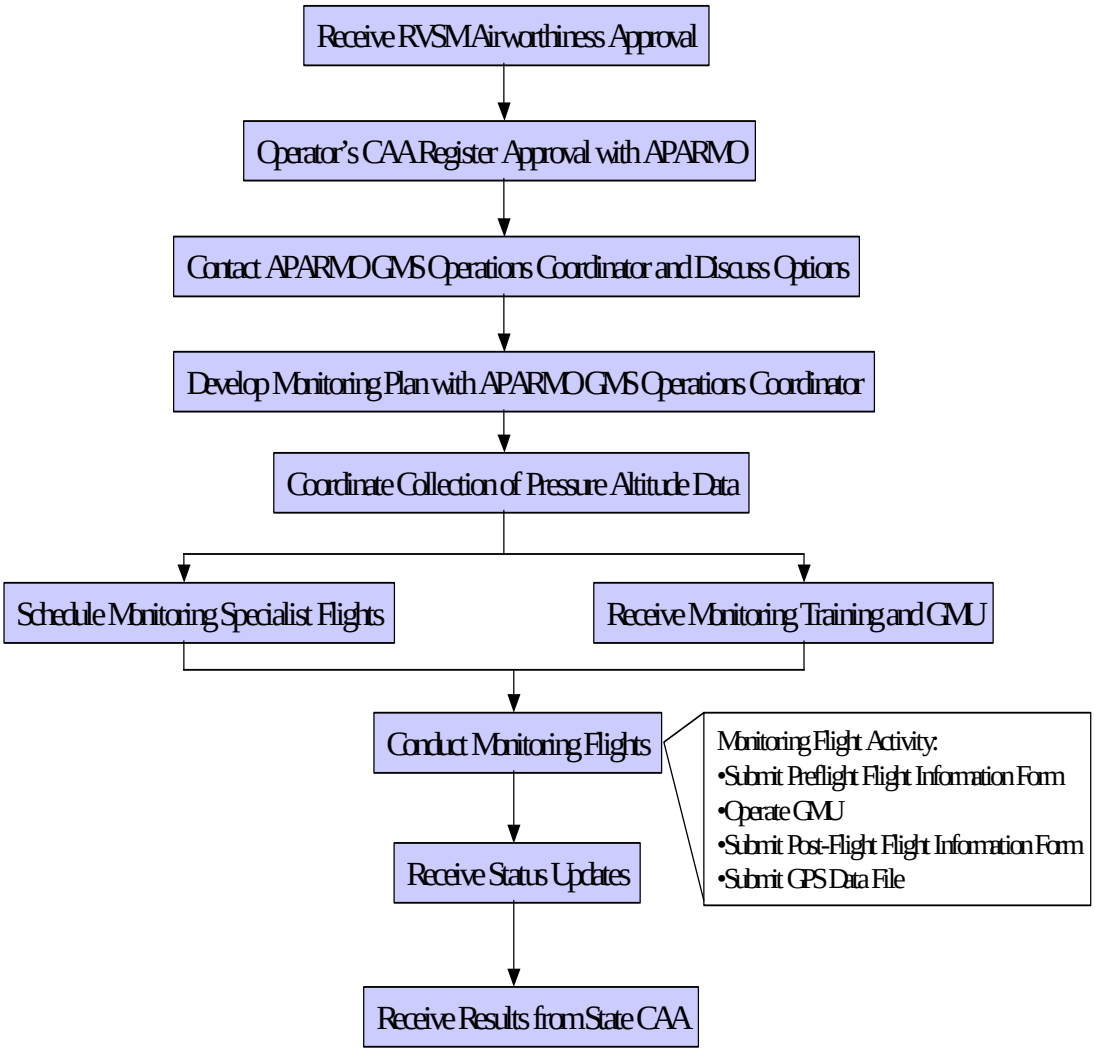
The operator will take the necessary steps to retrieve pressure altitude data from the digital flight data recorder (DFDR). The DFDR data should be sent to the APARMO as an electronic file. The specific format of the electronic file and the APARMO DFDR point of contact is contained in the following section.

To conduct the monitoring flight, the Monitoring Specialist or operator representative that has received GMS training, will perform the following tasks:

- Submit preflight FIF to APARMO and GMS Support Contractor
- Operate GMU
- Submit post-flight FIF to APARMO and GMS Support Contractor
- Submit GPS data files to GMS Support Contractor

The Monitoring process from the operator's perspective is illustrated in Figure 1. The operator will be notified by a facsimile memo as the FIF, GPS data file, and pressure altitude data file move through the post-flight processing steps at the APARMO.

Figure 1. Monitoring Process For Aircraft Operators



Digital Flight Data Recorder Data

Digital Flight Data Recorder (DFDR) data should contain altitude (ALT) expressed in feet with corresponding time (UTC) expressed in hours, minutes, and seconds HH/MM/SS to two decimal places and the aircraft transponder code (TXP). Altitude data submitted to the APARMO should have reports with 12-second or better intervals.

Providing aircraft position data for each level of flight further aids the APARMO in ASE calculation. Position data can be provided in latitude/longitude or range/azimuth (x/y) formats. A reference point is helpful when providing position data in the range/azimuth (x/y) format. Please provide the units of measurement for each piece of position data submitted to the APARMO.

DFDR Data Samples:

Range/Azimuth (X/Y) Data

TXP	X	Y	ALT	HH/MM/SS
5113	-284.969	197.938	36900	13/23/21.00

Latitude/Longitude Data

TXP	LAT	LON	ALT	HH/MM/SS
2241	54.833	4.494E	28000	17/57/42.00
2241	54.826	4.489E	28000	17/57/47.00

Sending DFDR data to the APARMO as an ASCII or text file via e-mail is recommended.

APARMO DFDR Point of Contact:

Phone: +1-609-485-5102

Fax: +1-609-485-5117

E-mail: Anthony.Strazzeri@tc.faa.gov

If e-mail is not available, the operator should send DFDR files on PC-formatted 3.5” diskettes to:

Mr. Anthony Strazzeri
FAA William J. Hughes Technical Center (WJHTC)
ACT-520
Atlantic City Airport, NJ 08405
U. S. A.

Monitoring Post-Flight Information

After completion of the monitoring flight, the GPS data will be processed by the GMS Contractor and forwarded to the APARMO. The operator will be advised by fax of the processing status of the data file. For the computation of the ASE, Meteorological data and Mode C data will be collected and merged with the GPS data at the APARMO. Final ASE results should be available from the APARMO within three weeks of the flight. The results will be sent to the State CAA and posted on the APARMO web site.

APARMO GMS Contacts:

APARMO Activities Coordinator
Phone: +1+609-485-5678
Fax: +1+609-485-5078
E-mail: 9-ACT-PARMO@faa.gov

CSSI Inc.,APARMO GMS Operations Coordinator:
Phone: +1+202 863-7426
Fax: +1+202-863-2398
E-mail: monitor@cssiinc.com

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Updated: 09 November 2001

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)

MONITORING APPLICATION

(return completed form by fax to +1-609-485-5078 and +1-202-863-2398)

Operator Name:_____

Address:_____

_____

Operator Primary Point of Contact

Name:_____Title:_____

Telephone Number: _____ Fax Number: _____

E-mail Address: _____

Secondary Point of Contact

Name:_____Title:_____

Telephone Number: _____ Fax Number: _____

E-mail Address: _____

Civil Aviation Authority Contact

Name:_____Title:_____

Telephone Number: _____ Fax Number: _____

E-mail Address: _____

_____

AIRCRAFT INFORMATION
(Please ensure that data for the ENTIRE fleet be included)

Aircraft Model	Registration Number	Serial Number

Updated: 09 November 2001

Flight Information Form (FIF)

APARMO USE

Please Fax to the APARMO at +1-609 485 5078 and +1-202-863-2398,
24 hours prior to flight and within 6 hours of landing.

INFORMATION TO BE RECORDED PRIOR TO FLIGHT		
Airline/Operator:		GMU Container Number:
Point of Contact for Operator: Name:	Phone:	Fax:
Aircraft Type/Series:	Aircraft Registration Number:	
Call Sign:	Airframe Serial Number:	
Planned: Origin:	Departure Date (UTC):	Departure Time (UTC):
Planned: Destination:	Arrival Date (UTC):	Arrival Time (UTC):
Installer (Name/Org.):	Retriever (Name/Org.):	
Mode S Equipped (Yes/No):	Separation Between Mounted Antennas (ft.):	
Installer/Operator Comments:		

INFORMATION TO BE RECORDED BY FLIGHT CREW/GMU OPERATOR		
Data Collection:	Start Date (UTC):	Start Time (UTC):
GMU File Name:		
Departure Time (UTC):	Origin (ICAO ID):	

Please record the requested information as soon as practical when:
1. Aircraft is first established in level flight at or above FL 290, or
2. The ATC assigned transponder code is changed at or above FL 290, or
3. There is a flight level change and aircraft remains at or above FL 290, or
4. An autopilot change is initiated at or above FL 290, or
5. The ARTCC or FIR changes.

Time	Assigned	Mach/Air	Xpndr	Altimeter Reading		Autopilot (L, R, C)		FMS/PMS	ARTCC/FIR
(UTC)	FL	Speed	Code/Source	Pilot	Co-pilot	Pilot	Co-pilot	(Y/N)	(ICAO ID)

Data Collection:	End Date (UTC):	End Time (UTC):
Arrival Time (UTC):	Destination ICAO (ID):	

Comments on flight conditions affecting height keeping performance, *i.e.* turbulence, and location.